Application No. 10/003,490
Attorney Docket No. 15-XZ-5547 (12732US01)

REMARKS

The present application includes claims 1-35. Claims 1-35 were rejected. Claims 1, 18 and 31 are amended to recite additional limitations in response to Examiner's rejection. Claims 17 and 30 are canceled.

Claim 1 is amended to recite the additional limitation of analyzing the low dose image to determine the positioning of the patient relative to said X-ray emitter and said X-ray detector, wherein said analyzing step is performed automatically by a computer algorithm. Claim 18 is amended to recite the additional limitation of verifying the positioning of the patient in the X-ray system via the low-dose pre-shot image before imaging the patient with a full-dose X-ray exposure, wherein said verifying step is performed automatically by a computer algorithm. Claim 30 is amended to recite the additional limitation of processing the low-dose pre-shot image to provide imaging parameters to be employed during a subsequent X-ray exposure, wherein said processing step includes automatically processing said low-dose pre-shot image to provide said imaging paramcters.

Claims 1-6, 18-29 and 31-35 were rejected under 35 U.S.C. § 103(a) as being anticipated by Klausz, U.S. Patent No. 4,633,494 in view of Smith et al., U.S. Patent No. 6,282,264.

Claims 17 and 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Klausz in view of Smith in view of Boyer, U.S. Patent No. 5,295,200.

The Applicant first turns to the rejection of claims 1-6, 18-29 and 31-35 under 35 U.S.C. § 103(a) as being anticipated by Klausz in view of Smith. Klausz relates to a method of controlling the positioning of a patient with respect to an x-ray device and installation for carrying out such method. Specifically, Klausz describes an x-ray table that moves in correspondence with electrical signals received from an operator (col. 3, lines 24-33). Klausz discloses a system that estimates the centering of an x-ray image given an operator-controlled displacement (i.e. Δx, Δy) of the x-ray table (col. 4, lines 35-68; col. 5, lines 1-2). That is, Klausz describes the decentering of an x-ray image based on operator inputs that displace the position of an x-ray table.

Klausz does not teach or suggest analyzing a low dose image to determine the positioning of a patient relative to an x-ray emitter and an x-ray detector, wherein the analyzing step is performed automatically by a computer algorithm. Rather, Klausz describes a system that estimates the centering of an x-ray image given an operator-controlled displacement (i.e. Δx, Δy) of the x-ray table (col. 4, lines 35-68; col. 5, lines 1-2). Klausz also does not teach or suggest verifying the positioning of a patient in an x-ray system wherein the verifying step is performed automatically by a computer algorithm. Conversely, Klausz describes an operator of the x-ray system examining an image created by a brief-pulse x-ray to determine if the operator has displaced the table a

sufficient amount (col. 4, lines 35-68; col. 5, lines 1-2). As described above, the table of Klausz is moved according to operator inputs (col. 3, lines 24-33; col. 4, lines 48-53). Furthermore, Klausz does not teach or suggest processing a low-dose pre-shot image to provide imaging parameters wherein the processing step includes automatically processing the low-dose pre-shot image to provide the imaging parameters. Instead, Klausz describes a system that re-centers an x-ray image based on table displacements (i.e. Δx, Δy) input by an operator (col. 4, lines 1-26). More generally, Klausz does not describe 1) determining any position of any patient whatsoever, whether completed by a computer algorithm or otherwise or 2) processing any image to provide any imaging parameters, whether completed automatically or otherwise.

Thus, the Applicant respectfully submits that Klausz does not teach or suggest the limitations of the claimed invention.

Smith relates to digital flat panel x-ray detector positioning in diagnostic radiology. Specifically, Smith discloses a variety of x-ray imaging systems, in which an image is computer analyzed and the orientation of the imaged body part is determined through image processing means and rotating the image before image storage (col. 15, lines 10-15). In addition, Smith describes a low-dose preview image being analyzed by an operator for proper positioning of the patient, detector and x-ray tube (col. 17, lines 52-61).

Smith does not describe analyzing a low dose image to determine a positioning of a patient wherein the analyzing step is performed automatically by a computer algorithm. Rather, Smith describes a low-dose preview image "analyzed by the operator for proper positioning . . . ." (col. 17, lines 52-61). Furthermore, Smith does not describe verifying the positioning of a patient, wherein the verifying step is performed automatically by a computer algorithm. Conversely, as described above, Smith describes the operator analyzing the low-dose image for proper positioning (col. 17, lines 52-61). In addition, Smith does not teach or suggest processing a low-dose pre-shot image to provide imaging parameters wherein the processing step includes automatically processing the low-dose pre-shot image to provide the imaging parameters. Instead, Smith describes several manners in which to possibly enhance the x-ray image (col. 13, lines 42-44), including moving the patient closer to the film (col. 13, lines 45-48), using the system parameters (such as x-ray tube voltage, power, object-imaging detector distance and source-imaging detector distance) to estimate a patient entrance dose (col. 14, lines 22-26), automatic correction of detector distance (col. 14, lines 34-51), notification of detector orientation (col. 14, lines 52-68; col. 15, lines 1-32), correction for effects of anti-scatter grids (col. 15, lines 43-68; col. 16, lines 1-43) and automatically moving the x-ray source when the detector is manually moved (col. 16, lines 43-65). However, Smith does not teach or suggest automatically processing the image to provide imaging parameters.

Thus, the Applicant respectfully submits that Smith does not teach or suggest the limitations of the claimed invention.

Furthermore, assuming for the sake of argument that one would combine Klausz and Smith, the combination results in an x-ray imaging system where an operator controls the displacement of an x-ray table and a low-dose x-ray image is re-centered based on the displacement of the x-ray table. Conversely, the present invention describes utilizing a low-dose image to determine if a patient is properly positioned, without either the displacement of an x-ray table by an operator or the re-centering of an x-ray image based on the displacement of the x-ray table.

Thus, the Applicant respectfully submits that the combination of Klausz and Smith does not teach or suggest the limitations of the claimed invention.

Claims 1, 18 and 31 are amended to recite additional limitations. Claim 1 is amended to recite the addition limitation of analyzing a low dose image to determine a positioning of a patient wherein the analyzing step is performed automatically by a computer algorithm. Claim 18 is amended to recite the additional limitation of verifying the positioning of a patient, wherein the verifying step is performed automatically by a computer algorithm. Claim 31 is amended to recite the additional limitation of processing a low-dose pre-shot image to provide imaging parameters wherein the processing step includes automatically processing the low-dose pre-shot image to provide the imaging parameters.

The present rejection encompasses independent claims 1, 18 and 31. Claims 1, 18 and 31 are amended to recite limitations not taught by either Klausz or Smith, either alone or in combination. Applicant respectfully submits that claims 1, 18 and 31 recite limitations that are not taught by either Klausz or Smith, alone or in combination. Consequently, the Applicant respectfully submits that independent claims 1, 18 and 31 should be allowable.

The Applicant next turns to the rejections of claims 17 and 30 under 35 U.S.C. § 103(a) as being unpatentable over Klausz in view of Smith in view of Boyer. Claims 17 and 30 are canceled by this Amendment. However, the currently amended claims 1 and 18 incorporate the limitations of the canceled claims 17 and 30. Therefore, the Applicant will discuss the rejection of claims 1 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Klausz in view of Smith in view of Boyer.

Boyer relates to a method and apparatus for determining the alignment of an object. Boyer describes comparing a current image to a stored, or reference image, to ensure the proper positioning of doses of radiation for radiotherapy treatment (col. 1, lines 22-31). Specifically, Boyer describes a means of measuring the degree of similarity between two images by applying an FFT correlation operation (Abstract; col. 1, lines 23-24; col. 2, lines 45-63; col. 3, lines 11-14; col. 3, lines 51-58; col. 4, lines 61-67). That is, Boyer discloses the comparison of a current image to an image stored in a memory in

order to measure a degree of patient alignment with a benchmark reference point (col. 5, lines 8-13).

Boyer does not teach or suggest analyzing a low dose image to determine the positioning of a patient relative to an x-ray emitter and an x-ray detector, wherein said analyzing step is performed automatically by a computer algorithm. Rather, Boyer describes comparing a current image to a stored, or reference image, to ensure the proper positioning of doses of radiation for radiotherapy treatment (col. 1, lines 22-31). In addition, Boyer does not teach or suggest verifying the positioning of the patient in an x-ray system via a low-dose pre-shot image before imaging the patient with a full-dose x-ray exposure, wherein said verifying step is performed automatically by a computer algorithm. Conversely, as described above, Boyer describes comparing a current image to a stored, or reference image, to ensure the proper positioning of doses of radiation for radiotherapy treatment (col. 1, lines 22-31).

Thus, the Applicant respectfully submits that Boyer does not teach or suggest the limitations of the claimed invention.

As described above, Klausz relates to a method of controlling the positioning of a patient with respect to an x-ray device and installation for carrying out such method and Smith relates to a digital flat panel x-ray detector positioning in diagnostic radiology. Boyer does not remedy the shortcomings of either Klausz or Smith as discussed above, either alone or in combination. Assuming for the sake of argument that one would

combine Klausz, Smith and Boyer, the combination would result in an x-ray system where an operator an operator controls the displacement of an x-ray table, and a low-dose x-ray image is re-centered based on the displacement of the x-ray table and compared to a previous x-ray image stored in a memory. Conversely, the present invention describes utilizing a low-dose image to determine if a patient is properly positioned, without either the displacement of an x-ray table by an operator, the re-centering of an x-ray image based on the displacement of the x-ray table or the comparison of a low-dose image to a previous x-ray image stored in a memory.

Thus, the Applicant respectfully submits a combination of Klausz, Smith and Boyer does not teach or suggest the limitations of the claimed invention.

Claims 1 and 18 are amended to recite additional limitations. Claim 1 is amended to recite the addition limitation of analyzing a low dose image to determine a positioning of a patient wherein the analyzing step is performed automatically by a computer algorithm. Claim 18 is amended to recite the additional limitation of verifying the positioning of a patient, wherein the verifying step is performed automatically by a computer algorithm.

The present rejection encompasses canceled dependent claims 17 and 30. Independent claims 1 and 18 are amended to recite limitations contained in canceled claims 17 and 30. The limitations of independent claims 1 and 18 are not taught by Klausz, Smith or Boyer, alone or in combination. Applicant respectfully submits that

claims 1 and 18 recite limitations that are not taught by either Klausz, Smith or Boyer, alone or in combination. Consequently, the Applicant respectfully submits that independent claims 1 and 18 should be allowable.

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CONCLUSION

The Applicant submits that the claims of the present invention should be in condition for allowance. If the Examiner has any questions or the Applicant can be of any assistance, the Examiner is invited and encouraged to contact the Applicant at the number below.

The Commissioner is authorized to charge any necessary fees or credit any overpayment to the Deposit Account of GTC, Account No. 070845.

Respectfully submitted,

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Christopher R. Carroll
Registration No. 52,700

McANDREWS, HELD & MALLOY, LTD.
500 West Madison Street, 34th Floor
Chicago, IL 60661

Telephone: (312) 775-8000
Facsimile: (312) 775-8100